MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2321
Gaithersburg, Maryland 20899-2321

MSDS Coordinator: Carmen S. Davis
Phone: (301) 975-6776
ChemTrec: 1-800-424-9300

FAX: (301) 926-4751
E-mail: SRMMSDS@nist.gov

SRM Number: 1665b
MSDS Number: 1665b
SRM Name: Propane in Air

Date of Issue: 26 November 2003

SECTION I. MATERIAL IDENTIFICATION

Material Name: Propane in Air

Description: This SRM mixture is supplied in a DOT 3AL specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 12.4 MPa (1800 psi), which provides the user with 0.73 m^3 (25.8 ft^3) of useable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-590 brass packless diaphragm valve, which is the recommended outlet for this propane mixture. NIST recommends that this cylinder not be used below 0.7 MPa (100 psi).

Other Designations: Propane (*n*-propane; dimethyl methane; propyl hydride; propylhydride; liquefied petroleum gas; LPG) in **Air Gas Cylinder**

Name	Chemical Formula	CAS Registry Number
Propane	$CH_3CH_2CH_3$	74-98-6
Air	complex mixture	132259-10-0

DOT Classification: Nonflammable Gas, UN1956

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Component	Nominal Concentration	Exposure Limits and Toxicity Data
Propane	3 μmol/mol	NIOSH TWA: 1 800 mg/m^3/10 hour(s)
		OSHA TWA: 1 800 mg/m^3

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Propane	Air
Appearance and Odor: colorless gas with a distinct odor	**Appearance and Odor:** colorless, odorless gas
Relative Molecular Mass: 44.11	**Relative Molecular Mass:** complex mixture
Density (@ -45 °C): 0.5853	**Density:** 1
Vapor Density (air = 1): 1.55	**Vapor Density (air = 1):** 1
Vapor Pressure (@ 20°C): 6536 mm Hg	**Vapor Pressure (@ -194 °C):** 760 mm Hg
Freezing Point (@ 4000 mm Hg): -190 °C	**Freezing Point:** -216 °C
Boiling Point: -42 °C	**Boiling Point:** -194 °C
Viscosity: not applicable	**Viscosity (@ 26.85 °C):** 0.01853 cP
Water Solubility: slightly soluble	**Water Solubility**: slightly soluble
Solvent Solubility: soluble in absolute alcohol, ether, chloroform, benzene, turpentine	**Solvent Solubility:** not available

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this propane/air mixture **DO NOT** exist. The actual behavior of the solution may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Properties Apply to Propane:

Flash Point: -105 °C **Method Used:** Not Available **Autoignition Temperature:** 450 °C

Flammability Limits in Air (Volume %): **UPPER:** 9.5
LOWER: 2.1

Unusual Fire and Explosion Hazards: Cylinders may rupture under fire conditions. Propane is a severe fire hazard when exposed to heat and/or flame. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Containers may rupture or explode if exposed to heat. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire.

Special Fire Procedures: Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA) when this material is involved in a fire. Keep fire cylinders cool with water spray. If possible, stop the product flow. High pressure gas may accelerate combustion.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** _____ **Unstable**

Conditions to Avoid: Protect cylinders from physical damage and sources of heat. **DO NOT** store the cylinder in poorly ventilated areas.

Incompatibility (Materials to Avoid): Propane is incompatible with combustible and oxidizing materials.

See Section IV: "Fire and Explosion Hazard Data".

Hazardous Decomposition or Byproducts: Thermal decomposition of propane will produce oxides of carbon.

Hazardous Polymerization _____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Health Hazard Data (Acute and Chronic)
Brief exposure to 10 000 mg/kg of propane caused no symptoms. Higher concentrations of the gas, produced slight dizziness but was not noticeably irritating to the nose or respiratory tract. Concentrations exceeding 100 000 mg/kg may produce disorientation, excitation, excessive salivation, headache, and vomiting. Skin exposure to the gas has no adverse effects; however, due to the rapid evaporation, in liquid form, frostbite with redness and pain can occur.

Medical Conditions Generally Aggravated by Exposure: Not Available

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration by qualified personnel. If breathing is difficult, give oxygen. Lay victim with head and chest lower than hips to improve drainage of fluids from the lungs. Obtain medical assistance.

Ingestion: Not Applicable (gas)

TARGET ORGAN(S) OF ATTACK: Propane: central nervous system (CNS)

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat. In case of leakage, use a self-contained breathing apparatus (SCBA).

Waste Disposal: Dispose of gas into an adequate amount of alkaline potassium permanganate solution. Dispose of non-refillable cylinders in accordance with federal, state, and local regulations. **DO NOT** return the empty cylinder to the supplier.

Handling and Storage: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Wear safety shoes when handling cylinders. Use adequate general and local exhaust ventilation to maintain concentrations below exposure limits and to avoid asphyxiation. A chemical safety shower and an eyewash station must be readily available. For protection of eyes, wear safety glasses.

> **NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store in well ventilated areas away from combustibles. Keep valve protection cap on cylinders when not in use.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Propane,* 19 March 2003.
MDL Information Systems, Inc., MSDS *Compressed Air, Breathing* Air, 19 March 2003.

Disclaimer: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified value for this material is given only on the NIST Certificate of Analysis.